

**Notice of Allowability**

Application No.

10/755,538

Applicant(s)

NORMAN, ROBERT D.

Examiner

Tuan V. Thai

Art Unit

2186

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

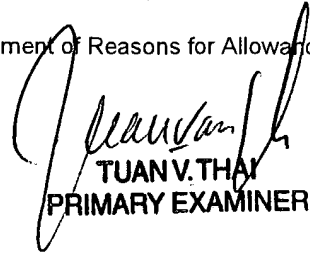
1. ☒ This communication is responsive to Examiner interview conducted on 07/22/04.
2. ☒ The allowed claim(s) is/are 1-6, 8-13, 15-17 and 19 renumbered as 1-16 respectively.
3. ☒ The drawings filed on 1/12/2004 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of the:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).  
\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached  
1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.  
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)  
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date 01/12/04  
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material  
5. ☐ Notice of Informal Patent Application (PTO-152)  
6. ☒ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_.  
7. ☒ Examiner's Amendment/Comment  
8. ☒ Examiner's Statement of Reasons for Allowance  
9. ☐ Other \_\_\_\_\_

  
TUAN V. THAI  
PRIMARY EXAMINER

Serial Number: 10/755,538

-Page 2-

Art Unit: 2186

Attorney's Docket No.: 703.067US4

IN THE UNITED STATES PATENT AND  
TRADEMARK OFFICE

In re application of: Robert D. Norman      Group: 2186  
Serial No.: 10/755,538      Examiner: Tuan Thai  
For: APPARATUS AND METHOD FOR REDUCING PROGRAMMING CYCLES  
FOR MULTISTATE MEMORY SYSTEM.

EXAMINER'S AMENDMENT

1. An Examiner's Amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 C.F.R. § 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the Issue Fee.

2. Authorization for this Examiner's Amendment was given in a telephone interview with Mr. Timothy B. Clise; Reg. No. 40,957 on July 22, 2004

3. The application has been amended as follows:

In the claims:

- a. Cancel claims 7, 14 and 18.
- b. Please amend claims 1, 8 and 16 as follows:

Art Unit: 2186

**Claim 1.** (Amended) A method of formatting data, comprising:

determining a total number of programming states values for storing input data in an array of multistate memory cells;

converting the input data to an encoded data based on the total number of programming states such that a total number of programming states for storing the encoded data is less than the total number of programming states for storing the input data; and

arranging the encoded data and a decoding scheme in a data packet, wherein the decoding scheme converts the encoded data back to the input data[.];

counting a number of times each programming state of the multistate memory cells is traversed in programming the memory cells with the set of data when using an encoding scheme; and assigning the programming states of the memory cells in order from the lowest to highest programming state to the programming states which were traversed in order the highest to lowest number of times in programming the memory cells using the encoding scheme.

**Claim 8.** (Amended) A method of formatting data, comprising:

determining a total number of programming states values for storing input data in a memory array;

Art Unit: 2186

converting the input data to an encoded data based on the total number of programming states such that a total number of programming states for storing the encoded data is less than the total number of programming states for storing the input data;

arranging the encoded data and a decoding scheme in a data packet, wherein the decoding scheme converts the encoded data back to the input data; and

storing the data packet in a memory[.];

counting a number of times each programming state of the memory cells is traversed in programming the memory cells with the set of data when using an encoding scheme.

**Claim 16.** (Amended) A method of formatting data, comprising:

determining a total number of programming states values for storing input data in a memory array;

converting the input data to an encoded data based on the total number of programming states such that a total number of programming states for storing the encoded data is less than the total number of programming states for storing the input data;

arranging the encoded data and a decoding scheme in a data packet, wherein the decoding scheme converts the encoded data back to the input data, wherein arranging the encoded data and the decoding scheme includes arranging error correction codes, bad bit address, and replacement bit addresses in the data

Art Unit: 2186

packet; and

storing the data packet in the memory array[.];

wherein determining a total number of programming states values includes determining the number of states of a flash memory.

#### REASONS FOR ALLOWANCE

4. The following is an Examiner's Statement of Reasons for Allowance:

The prior arts of record do not teach nor suggest, *either alone or in combination*, all the limitations of the claimed invention (claims 1, 8 and 16), particularly method for reducing the number of programmed states required to be traversed when formatting or programming a multistate memory cell with a given set of data by determining a total number of programming states values for storing input data in an array of multistate memory cells; converting the input data to an encoded data based on the total number of programming states such that a total number of programming states for storing the encoded data is less than the total number of programming states for storing the input data; and arranging the encoded data and a decoding scheme in a data packet, wherein the decoding scheme converts the encoded data back to the input data, and counting a number of times each programming state of the multistate memory cells is traversed in

Art Unit: 2186

programming the memory cells with the set of data when using an encoding scheme; and assigning the programming states of the memory cells in order from the lowest to highest programming state to the programming states which were traversed in order the highest to lowest number of times in programming the memory cells using the encoding scheme.

In light of the foregoing the claims of the present application are found to be patentable over the prior art.

Claims 2-6, 9-13, 15, 17 and 19 further limit the allowable independent claims. These claims are therefore allowable for the same reason as set forth above.

Any comments considered necessary by Applicant must be submitted no later than the payment of the Issue Fee and, to avoid processing delays, should preferably **accompany** the Issue Fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan V. Thai whose telephone number is (703) 305-3842. The examiner can normally be reached on from 6:30 A.M. to 4:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mathew M. Kim can be reached on (703)-305-3821. The fax phone number for the

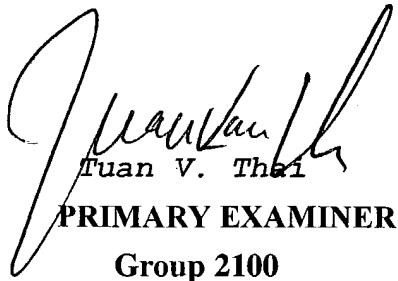
Serial Number: 10/755,538

-Page 7-

Art Unit: 2186

organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TVT/July 22, 2004

  
Tuan V. Thai  
**PRIMARY EXAMINER**  
**Group 2100**